

REMARKS

In the final Office Action mailed November 26, 2002, claims 1, 5, 7, 8-14 were rejected under 35 USC 102(b) as being anticipated by Lyon (U.S. Patent 5,675,665), claim 2 was rejected under 35 USC 103(a) as being unpatentable over Lyon, and claims 3, 4, and 6 were rejected under 35 USC 103(a) as being unpatentable over Lyon in view of Tsuruoka et al. (Handwritten "KANJI" and "HIRAGANA" Character Recognition Using Weighted Direction Index Histogram Method). The foregoing rejections are respectfully traversed.

Claims 1-14 are pending and under consideration. Claims 1 and 9-14 are independent claims. Claims 2-8 depend either directly or indirectly from claim 1.

In accordance with the foregoing, claims 1 and 9-14 have been amended. A Version with Markings to Show Changes Made to the claims is included herewith. Care has been exercised to avoid the introduction of new matter.

Lyon relates to the division of a word, the extraction of a character from the word, and the recognition of the character. Moreover, Lyon performs character recognitions over characters extracted from a recognition target for the purposes of generating bounds model pairs to which the recognition target is compared. That is, in the Lyon system, a recognition target corresponding to a plurality of radicals or characters is separated into parts each corresponding to a character unit for generating a bounds measurement pair of the recognition target. In the Lyon system, it is impossible to generate a bounds measurement pair without separating a recognition target into parts each corresponding to a character unit.

Figures 14-16, and col. 20 at lines 34-62, of Lyon discloses that each Chinese ideograph shown in Figures 14-16 is divided into radicals, and that each radical is recognized by the recognition unit 22 in much the same way that characters are recognized (refer to Lyon, col. 20 at lines 34-62). That is, the Lyon apparatus/method divides the ideographs into radicals, recognizes the radicals and from that recognition, recognizes the ideograph.

Tsuruoka discloses a weighted direction index histogram method. The process associated with Tsuruoka et al. as shown in Fig. 3(b) and Fig. 4(b) involves the use of a two-dimensional Gaussian filter. More particularly, lines 13-14 in section 2.3 Realization, of Tsuruoka et al. reads "these sets of values given as weighting factors of filters respectively are in accordance to the 2-dimension space Gaussian distribution". Therefore, the foregoing

section of Tsuruoka et al. indicates that in the Tsurouka apparatus, gradating conversion is performed in same direction as character connecting.

The combination, therefore, of Lyon and Tsuruoka is an apparatus which performs character recognition over characters extracted from a recognition target for the purposes of generating bounds model pairs to which the recognition target is compared, using a weighted direction index histogram method, and in which the bounds measurement pair must be generated by separating a recognition target into parts each corresponding to a character unit.

In contrast to the foregoing references relied upon, each of independent claims 1 and 9-14 of the present application recites (using the recitation of claim 1 as an example) "extracting a feature amount from a recognition target by a process in which the recognition target is not required to be divided into units even if the recognition target comprises a plurality of units".

Moreover, and also in contrast to the foregoing references relied upon, each of independent claim 1 and 9-13 of the present application recites (again using the recitation of claim 1 as an example) "at least one candidate word comprising a plurality of characters".

In addition in contrast to the foregoing references relied upon, independent claim 14 of the present application recites "dividing a recognition target in units of meshes, a number of the meshes changed according to a length of the recognition target when the recognition target comprises a plurality of characters, the recognition target not required to be divided into units even if the recognition target comprises a plurality of units, and extracting a feature amount from the divided recognition target".

In addition, dependent claims 2-8 recite patentably distinguishing features of their own. For example, claim 2/1 recites "said collating unit includes a memory storing the feature amount of the word, and releases the memory when a collation of the feature amount of the word is completed".

Withdrawal of the foregoing rejections is respectfully requested.

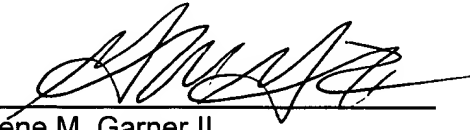
If there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please AMEND the following claims:

1. (FIVE TIMES AMENDED) A word recognizing apparatus, comprising:
a listing unit storing a list of at least one candidate word comprising a plurality of characters;
a dictionary unit storing feature amounts of a plurality of characters;
an extracting unit extracting a feature amount from a recognition target by a process in which the recognition target is not required to be divided [in] into units [of characters] even if the recognition target comprises a plurality of [characters] units;
a generating unit referring to the list of at least one candidate word stored in said listing unit, and dynamically generating a feature amount of only a candidate word registered in the list using the feature amounts of characters stored in said dictionary unit during a recognition process for the recognition target; and
a collating unit collating the generated feature amount of the word with the feature amount extracted from the recognition target, and outputting a recognition result.
2. (As Once AMENDED) The word recognizing apparatus according to claim 1, wherein said collating unit includes a memory storing the feature amount of the word, and releases the memory when a collation of the feature amount of the word is completed.
3. (AS TWICE AMENDED) The word recognizing apparatus according to claim 1, further comprising:
an inputting unit inputting an image as the recognition target; and
an extracting unit performing a one-dimensional gradating conversion in a direction perpendicular to a connecting direction of characters for a direction code histogram of a contour line in each of a plurality of small areas in an inputted image provided that no gradating conversion is performed in the connecting direction of the characters, and extracting a direction code histogram series obtained from a conversion result as the feature amount of the recognition target.
4. (As Once AMENDED) The word recognizing apparatus according to claim 3,

wherein said extracting unit divides a length of the inputted image in the direction perpendicular to the connection direction of characters by a predetermined integer and divides the image into the small areas with an obtained quotient as a size of each of the small areas.

5. (As Once AMENDED) The word recognizing apparatus according to claim 1, wherein said generating unit generates the feature amount of the word by using feature amounts of a plurality of characters.

6. (As Once AMENDED) The word recognizing apparatus according to claim 5, wherein said generating unit generates a new direction code histogram series by arranging a plurality of direction code histogram series corresponding to the feature amounts of characters composing the word and designating a generated direction code histogram series as the feature amount of the word.

7. (As Once AMENDED) The word recognizing apparatus according to claim 1, wherein said collating unit performs a non-linear matching of the feature amount of the word and the feature amount of the recognition target, and calculates a degree of similarity between the feature amount of the word and the feature amount of the recognition target.

8. (As Once AMENDED) The word recognizing apparatus according to claim 1, wherein said listing unit stores a list which has a high possibility of containing a word corresponding to the recognition target.

9. (FIVE TIMES AMENDED) A word recognizing apparatus, comprising:
a listing unit storing a list of at least one candidate word comprising a plurality of characters;

an extracting unit extracting a feature amount from a recognition target by a process in which a recognition target is not required to be divided [in] into units [of characters] even if the recognition target comprises a plurality of [characters] units;

a generating unit referring to a list of at least one recognition candidate word, and dynamically generating a feature amount of only a recognition candidate word registered in the list using feature amounts of characters during a recognition process for the recognition

target; and

a collating unit collating the generated feature amount of the word with the feature amount extracted from the recognition target, and outputting a recognition result.

10. (FIVE TIMES AMENDED) A recognizing apparatus, comprising:

a listing unit storing a list of at least one candidate word comprising a plurality of characters;

an extracting unit extracting a feature amount from a recognition target by a process in which a recognition target is not required to be divided [in] into units [of characters] even if the recognition target comprises a plurality of [characters] units;

a generating unit referring to a list of at least one recognition candidate pattern string, and dynamically generating a feature amount of only a recognition candidate pattern string registered in the list using feature amounts of patterns during a recognition process for the recognition target; and

a collating unit collating the generated feature amount of the pattern string with the feature amount extracted from the recognition target, and outputting a recognition result.

11. (FIVE TIMES AMENDED) A computer-readable storage medium on which is recorded a program causing a computer to execute a process, said process comprising:

storing a list of at least one candidate word comprising a plurality of characters;

extracting a feature amount from a recognition target by a process in which a recognition target is not required to be divided [in] into units [of characters] even if the recognition target comprises a plurality of [characters] units;

dynamically generating by referring to a list of at least one recognition candidate word a feature amount of only a recognition candidate word registered in the list using feature amounts of characters during a recognition process for the recognition target; and

collating the generated feature amount of the word with the feature amount extracted from the recognition target.

12. (FIVE TIMES AMENDED) A computer-readable storage medium on which is recorded a program causing a computer to execute a process, said process comprising:

storing a list of at least one candidate word comprising a plurality of characters;

extracting a feature amount from a recognition target by a process in which a recognition target is not required to be divided [in] into units [of characters] even if the recognition target comprises a plurality of [characters] units;

dynamically generating by referring to a list of at least one recognition candidate pattern string a feature amount of only a recognition candidate pattern string registered in the list using feature amounts of patterns during a recognition process for the recognition target; and

collating the generated feature amount of the pattern string with the feature amount extracted from the recognition target.

13. (FIVE TIMES AMENDED) A recognizing method, comprising:

generating a list of at least one candidate pattern string comprising a plurality of characters;

generating a dictionary [for] storing feature amounts of a plurality of patterns;

extracting a feature amount from a recognition target by a process in which a recognition target is not required to be divided [in] into units [of characters] even if the recognition target comprises a plurality of [characters] units;

dynamically generating by referring to the list of the at least one candidate pattern string a feature amount of only a pattern string registered in said list using feature amounts of patterns stored in said dictionary during a recognition process for the recognition target; and

collating the generated feature amount of the pattern string with the feature amount extracted from the recognition target.

14. (ONCE AMENDED) A word recognizing apparatus, comprising:

a listing unit storing a list of at least one candidate word;

a dictionary unit storing feature amounts of a plurality of characters['];

an extracting unit dividing a recognition target in units of meshes, a number of the meshes changed according to a length of the recognition target when the recognition target comprises a plurality of characters, the recognition target not required to be divided [in] into units [of characters] even if the recognition target comprises a plurality of [characters] units, and extracting a feature amount from the divided recognition target;

a generating unit referring to the list of at least one candidate word stored in said listing unit, and dynamically generating a feature amount of only a candidate word registered in the list using the feature amounts of characters stored in said dictionary unit during a recognition process for the recognition target; and

a collating unit collating the generated feature amount of the word with the feature amount extracted from the recognition target, and outputting a recognition result.